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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,406	03/26/2004	James Burdorf	102-0090US-C	8581

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EXAMINER

LE, BRIAN Q

ART UNIT	PAPER NUMBER
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2624

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/810,406

Applicant(s)

BURDORF ET AL.

Examiner

Brian Q. Le

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 28-54 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 28-54 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>03/26/2004</u> . | 6) <input type="checkbox"/> Other: ____. |

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 28-54 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Regarding independent claims 28, 38 and 46, the support for limitation of “generating a simulated image, wherein the simulated image ..., and **not merely by smoothing the geometries of the original pattern data**; and comparing the aerial image to the simulated image” (emphasis added) and similar limitations in scope are not found in the original disclosure. The Applicant is required to provide exact support (page number and line number) the discussed limitations. Appropriate correction is required. The prior art rejection based on the Examiner’s best understanding.

Also regarding to limitations “mask includes proximity effect corrections”, “simulated image is generated from original pattern data which includes the proximity effect corrections”, “mask includes phase shifting techniques” and other limitations similar in scope of claims 29-31, 37, 39-41, 45, 48-50, and 54; the specification does not enable or support all possible techniques. While the specification is enabling for the general comparison of images to determine defects, it is not enabling for the systems wherein the claims cover a photomask with specific information and a simulated image that takes into account other information. While these features are, in general, mentioned in the specification, the specification does not explain how they are used or

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how the comparison is performed with respect to these features nor does it specify how the comparison is effected by the presence of these features and how the applicant is using these features to modify or change the comparison process. Without these details, one of ordinary skill in the art would be burdened to make or use the claimed invention.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 29-31, 37, 39-41, 45, 48-50, and 54 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding the limitations “mask includes proximity effect corrections”, “simulated image is generated from original pattern data which includes the proximity effect corrections”, “mask includes phase shifting techniques” and other limitations similar in scope; the limitations are vague and unclear as to what these “techniques” are and how they are taken into account. The claims do not make clear what these elements are supposed to be doing. They are simply statements of intended use (or intended types of data) without any supporting limitations to specify how the statements are to effect the comparison process. Appropriate correction is required. The prior art rejection based on the Examiner’s best understanding.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 28, 32, 36, 38, 42, 44, 51, and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsui et al. U.S. Patent No. 5,850,467.

Regarding claim 28, Matsui teaches a method for detecting defects in masks used in a lithography process to pattern structures on a workpiece (process image data of mask for inspection to find defects) (column 7, lines 25-35), wherein the lithography process comprises the use of lithographic parameters (width and height of a pattern) (column 4, lines 54-67), comprising:

Generating an aerial image of at least a portion of a mask, wherein the mask is formed using original pattern data (FIG. 3, elements 21, S1, D1, S4 and D1A);

Generating a simulated image (FIG. 3, elements D21, S2, D2, S3 and D2A), wherein the simulated image comprises a prediction of the image formed by the masking during its use in the lithography process as created by the interaction of the original pattern data (the process of which facilitates the matching of mask by enlarged/reduced the image data) (column 4, lines 15-23) and the lithographic parameters (enlarge/reduce by parameters as width and height) (column 4, lines 55-67), and not merely by smoothing the geometries of the original pattern data (remove

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impurity region/image correction/sizing) (column 6, lines 13-20 and FIG. 3, S3-S4); and comparing the aerial image to the simulated image (FIG. 3, S5).

Regarding claim 32, Matsui teaches the masks are used in the manufacture of integrated circuits (semiconductor chip) (column 7, lines 30-35).

For claim 36, Matsui discloses the method wherein the aerial image and the simulated image are generated out of focus (the enlarge or reduction of image data is performed when the image data are out of focus) (column 4, lines 15-22).

Regarding claim 38, please refer back to claim 28 for further teachings and explanations.

For claim 42, please refer back to claim 32 for further teachings and explanations.

For claim 44, please refer back to claim 36 for further teachings and explanations.

For claim 51, please refer back to claim 32 for further teachings and explanations.

For claim 53, please refer back to claim 36 for further teachings and explanations.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 29-31, 37, 39-41, 45-50, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui et al. U.S. Patent No. 5,850,467.

Regarding claims 29-31, as best that these limitations are understood, while the reference does not explicitly state that the mask incorporates “proximity effect corrections” (claim 29) ; simulated image includes proximity effect corrections (claim 30) and “mask includes phase

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shifting techniques” (claim 31). It would have been obvious to one of ordinary skill in the art to use these type of processing/data to better recognize defects as the systems are for finding defects and it would have been obvious to accommodate for any known artifacts presented by the imaging system and other artifacts (such as variations in lighting or coloring or optical distortions caused by lenses and other optical elements) because this is regularly performed to produce a better recognition system (Office Notice) as such artifacts are well known problems and their accommodation is a standard process.

For claim 37, please refer back to the explanations of claims 29-31 respectively for further discussion.

For claims 39-41, please refer back to the explanations of claims 29-31 respectively for further discussion.

For claim 45, please refer back to the explanations of claims 29-31 respectively for further discussion.

Regarding claim 46, please refer back to the teachings of claim 28, and 29-31 for further discussion and explanation.

For claim 47, Matsui discloses the apparatus wherein the stimulated image generating system comprises an aerial image measurement system (column 4, lines 55-67 and column 7, lines 10-17).

For claims 48-50, please refer back to the explanations of claims 29-31 respectively for further discussion.

For claim 54, please refer back to the explanations of claims 29-31 respectively for further discussion.

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9. Claims 33, 34-35, 43 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui et al. U.S. Patent No. 5,850,467 as applied to claim 28 above, and further in view of Martin et al. "X-Ray Lithography – An Overview", I.E.E.E. Volume 81, Issue 9, September 1993 Pages: 1249 - 1274.

Regarding claim 33, Matsui teaches a mask concept (as discussed in claim 28). Matsui does not explicitly teach the mask comprises an x-ray mask. Martin teaches a lithography process (page 1249, column 1, first paragraph) wherein the mask comprises an x-ray mask (page 1250, column 2, last paragraph). Modifying Matsui's method of inspection defects in masks according to Martin would be able to also use x-ray mask. This would improve processing because x-ray masking and x-ray lithography help speed up the proximity effect correction (page 1252, column 2, first paragraph) and therefore, it would have been obvious to one of the ordinary skill in the art to modify Matsui according to Martin.

To claim 34, Martin further teaches the method wherein the mask comprises a stencil mask (metal x-ray mask) (FIG. 4) for ion projection lithography (electron-beam lithograph) (page 1249, column 1, first paragraph and page 1252, column 1, last paragraph).

For claim 35, Martin also teaches the method wherein the mask comprises a mask for electron beam projection lithography (page 1252, column 1, last paragraph).

For claim 43, please refer back to claim 33 for further teachings and explanations.

For claim 52, please refer back to claim 33 for further teachings and explanations.

CONCLUSION

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Q. Le whose telephone number is 571-272-7424. The examiner can normally be reached on 8:30 A.M - 5:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on 571-272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Brian Le
May 23, 2007